

This Page Is Inserted by IFW Operations
and is not a part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images,
please do not report the images to the
Image Problem Mailbox.**

THIS PAGE BLANK (USPTO)

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
8 March 2001 (08.03.2001)

PCT

(10) International Publication Number
WO 01/16054 A3

(51) International Patent Classification⁷: **C04B 41/91**,
35/628, 35/565, F16C 33/04, A61L 27/10, H01L 21/306,
B01J 27/22

(74) Agent: **ANDERSON, Richard, H.**: Marshall, O'Toole,
Gerstein, Murray & Borun, 6300 Sears Tower, 233 S.
Wacker Drive, Chicago, IL 60606 (US).

(21) International Application Number: PCT/US00/23343

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ,
DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,
HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ,
NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM,
TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(22) International Filing Date: 24 August 2000 (24.08.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/152,013 1 September 1999 (01.09.1999) US
09/568,312 9 May 2000 (09.05.2000) US

(84) Designated States (*regional*): ARIPO patent (GH, GM,
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian
patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European
patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE,
IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG,
CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(71) Applicant: **THE BOARD OF TRUSTEES OF THE
UNIVERSITY OF ILLINOIS [US/US]**: 349 Henry
Administration Building, 506 S. Wright Street, Urbana, IL
61801 (US).

Published:
— with international search report

(72) Inventors: **MCNALLAN, Michael, J.**: 309 N. Elmwood
Avenue, Oak Park, IL 60302 (US). **ERSOY, Daniel**:
7251 N. Kilpatrick Avenue, Lincolnwood, IL 60046 (US).
GOGOTSI, Yury: 1125 Hunter Street, Lombard, IL
60148 (US).

(88) Date of publication of the international search report:
10 May 2002

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.



WO 01/16054 A3

(54) Title: A PROCESS FOR CONVERTING A METAL CARBIDE TO CARBON ON THE SURFACE OF THE METAL CARBIDE BY ETCHING IN HALOGENS

(57) Abstract: A process for the synthesis of carbon coatings on the surface of metal carbides, preferably SiC, by etching in a halogen-containing gaseous etchant, and optionally hydrogen gas, leading to the formation of a carbon layer on the metal carbide. The reaction is performed in gas mixtures containing about 0 % (trace) amounts to 100 % halogen-containing gaseous etchant, e.g., Cl₂, and about 0 % to 99.9 % H₂ (hydrogen gas) at temperatures from about 100 °C to about 4,000 °C, preferably about 800 °C to about 1,200 °C, over any time range, maintaining a pressure of preferably about one atmosphere, to about 100 atmospheres.

B14

INTERNATIONAL SEARCH REPORT

national Application No

PCT/US 00/23343

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C04B41/91 C04B35/628 C04B35/565 F16C33/04 A61L27/10
H01L21/306 B01J27/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, COMPENDEX, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ERSOY D A ET AL: "High temperature chlorination of SiC for preparation of tribological carbon films" PROCEEDINGS OF THE SYMPOSIUM ON HIGH TEMPERATURE CORROSION AND MATERIALS CHEMISTRY, PROCEEDINGS OF THE SYMPOSIUM ON HIGH TEMPERATURE CORROSION AND MATERIALS CHEMISTRY, SAN DIEGO, CA, USA, 3-8 MAY 1998, pages 324-333, XP000981692 1998, Pennington, NJ, USA, Electrochem. Soc, USA ISBN: 1-56677-203-6	1-14
A	abstract page 324, line 1 - line 2 page 325, paragraph 3 -page 326, paragraph 1; table 1 page 328, paragraph 3 -/-	16,52-54



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

8 February 2001

Date of mailing of the international search report

27.06.2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Rosenberger, J

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 00/23343

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p> GOGOTSI, Y G ET AL: "CARBON COATINGS ON SILICON CARBIDE BY REACTION WITH CHLORINE-CONTAINING GASES" JOURNAL OF MATERIALS CHEMISTRY, GB, THE ROYAL SOCIETY OF CHEMISTRY, CAMBRIDGE, vol. 7, no. 9, 1 September 1997 (1997-09-01), pages 1841-1848, XP000724179 ISSN: 0959-9428 cited in the application page 1841, right-hand column, paragraph 6 -page 1842, left-hand column, paragraph 2 page 1848, left-hand column </p>	<p> 1-14, 16-23, 52-54 </p>

INTERNATIONAL SEARCH REPORT

international application No.
PCT/US 00/23343

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 15
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
see FURTHER INFORMATION sheet PCT/ISA/210
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-14, 16-23, 52-54

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-14,16-23,52-54

1.1. Claims: 1-14

A process for the synthesis of a carbon surface on a monolithic piece being predominately of metal carbide comprising reacting a surface of said monolithic piece with a halogen-containing gas.

1.2. Claims: 16-23

A bearing made by a process comprising the process steps of claim 1.

1.3. Claim : 52

A catalyst comprising a catalyst support made by a process comprising the process steps of claim 1.

1.4. Claim : 53

A molecular sieve made by a process comprising the process steps of claim 1.

1.5. Claim : 54

A process for the synthesis of an ion-exchange material comprising the process steps of claim 1.

2. Claims: 24-29

A method of manufacturing a prosthesis comprising the process steps of claim 1 and a prosthesis made by this process.

3. Claims: 30-40,50,51

An electrical contact made by a process comprising the process steps of claim 1.

4. Claims: 41-49

A silicon microstructure made by a process comprising the process steps of claim 1.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 15

Present claim 15 relates to a method for manufacturing a bearing from a mass of surface-treated metal carbide particles. However neither support within the meaning of Article 6 PCT, 3rd sentence, nor disclosure within the meaning of Article 5 PCT is to be found in the description for claim 15.

In the present case, the claim so lacks support and disclosure, that a search would be without meaning - in other words a meaningful search is not possible.

Consequently, no search has been carried out for claim 15.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

THIS PAGE BLANK (USPTO)